600 MHz Duplexer for the 2 x 35 MHz Band Plan

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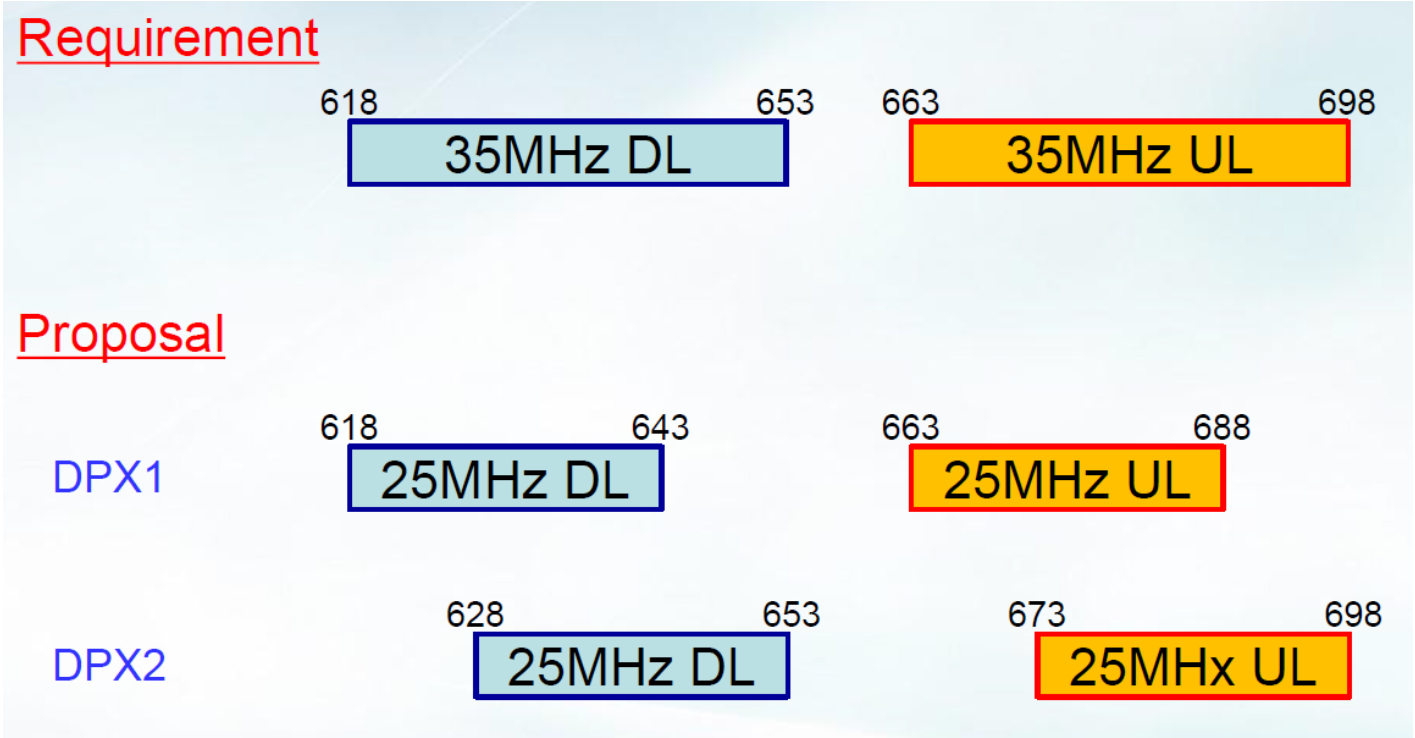
Duplexer Proposal from a Filter Vendor



Split Band Considerations

- It seems that with todays's technology 2 x 35 MHz single duplexer is not feasible.
  - Main issue is the wide pass band (>5%); the duplex gap (1.5%) is not as problematic.
  - 2 x 25 MHz with 10 MHz duplex gap would be feasibe
- When filter technology improves single filter may become feasible
  - FCC or 3GPP specification for the band should not limit the filter implementation.
- Required overlap for the split band filters depends on the widest channel bandwidth and the position of the widest channel inside the band.
  - In 3GPP specification it is normally assumed that channel can be located anywhere within the band but it can be limited to enable split band implementation with narrower duplexer BW
  - For example in 3GPP TS 36.101 V11.3.0 table 5.6.1-1 there is a note for band 28 that limits the 20 MHz channel position: *NOTE 2: For the 20 MHz bandwidth, the minimum requirements are specified for E-UTRA UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz*

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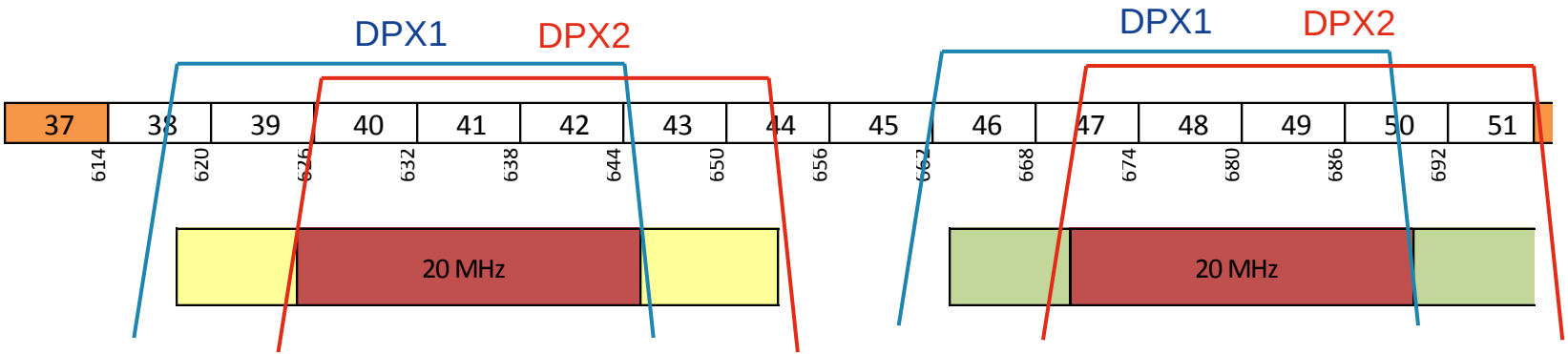
Dual Duplexer Overlap

- Terminal would use only one duplexer at a time so LTE channel must be able to pass completely through one duplexer
- Widest overlap is needed if 20 MHz channel is located in the middle of the band (20 MHz overlap -> 27.5 MHz duplexer BW)
- This is not likely to be a practical scenario

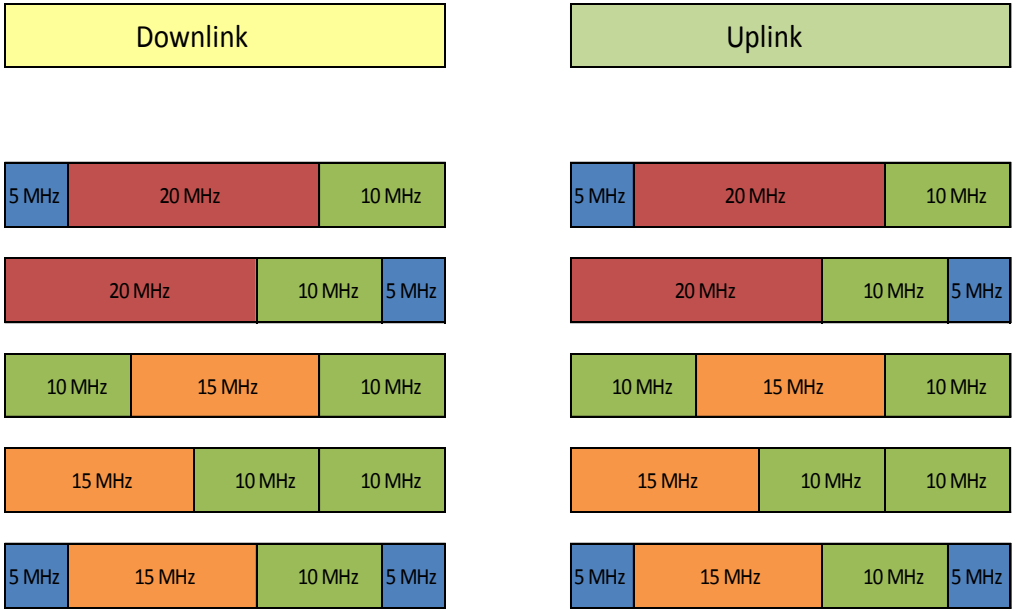


Channelization Examples

5 MHz channel raster is assumed in the examples because it fits best to LTE channel BW options

With 20 MHz max ch BW 2 x 25 MHz duplexer is needed unless 20 MHz channel location is limited strictly to band edges

With 15 MHz max ch BW the middle position still leads to 2 x 25 MHz duplexers, but offsetting 5 MHz or more up or down makes 2 x 20 MHz duplexer possible



RF Front End Architecture Based on Split Band Duplexer

- Split band approach means slightly increased size and cost compared to a single duplexer
  - Duplexer size is typically 2.5 x 2.0 mm and cost a few tens of cents
- In TX side a switch is used after the PA to select correct sub-band
  - Switch adds some loss (<0.5 dB) but on the other hand split band duplexer loss is low
- If there is support for 700 MHz band(s) same PA can probably cover that as well
- The RX port cont in current RFICs is limited but it is increasing significantly in near future
- Extra complexity of split band approach is about the same as adding a new frequency band